Report for:

GTO Engineering

GTO Car Restoration Centre, Twyford

Air Quality Assessment

Status: Final **Date: 02.12.2024**

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Contents

List of Tables

1. INTRODUCTION

ACCON UK Limited (ACCON) has been commissioned by Murray Planning Associates on behalf of GTO Engineering to carry out an Air Quality Assessment for the proposed redesign and expansion of facilities at the existing car restoration centre at Bath Road, Twyford. The proposed development consists of the demolition of the existing storage shed and the construction of a new GTO Car Restoration Centre in its place.

The proposed development is located within the administrative boundary of Wokingham Borough Council (WBC).

The proposed development is expected, at the earliest, to be first operational during 2025, which for air quality purposes will be utilised as a worst-case scenario.

This assessment has been completed in order to determine whether the proposed development achieves compliance against the National Air Quality Objectives (NAQOs), along with National and Local Planning Policy. The assessment has been undertaken in accordance with the Department for Environment, Food and Rural Affairs' (DEFRA) current Technical Guidance on Local Air Quality Management (LAQM.TG22.)[1] and covers the effects of local air quality on the development.

The report assesses the overall pollutant concentrations of nitrogen dioxide (NO_2) and particulates (PM_{10} and $PM_{2.5}$) at nearby existing sensitive receptors. A glossary of terms is detailed in **Appendix 1** and the location of the site is shown in **Figure 3.1**. **Appendix 4** identifies nearby sensitive receptor locations, modelled to assess the impacts of additional traffic emissions associated with the operation of the development.

The potential air quality impacts of the development with respect to traffic generation have been assessed on the basis of the findings of detailed dispersion modelling using Breeze Roads GIS Pro Version 5.1.8, which has been undertaken in the context of relevant NAQOs, emission limit values and relevant guidance.

[1] DEFRA, Local Air Quality Management Technical Guidance 2021.

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2. AIR POLLUTION POLICY CONTEXT

2.1. Legislation

2.1.1. Air Quality Strategy and Local Air Quality Management (LAQM)

Part IV of the Environment Act 1995 requires the Secretary of State to publish an air quality strategy and local authorities to review and assess the quality of air within their boundaries.[2] The latter has become known as Local Air Quality Management (LAQM), which commenced in 1997, an instrument by which the Government's air quality objectives are to be achieved over a determined period of time.

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volume 1) provides the policy framework for local air quality management and assessment in the UK. It sets out air quality standards and objectives for key air pollutants which are designed to improve air quality and protect human health and the environment from the effects of pollution. For the purpose of the strategy, the terms are defined below:

- **standards** are the concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on assessment of the effects of each pollutant on human health including the effects on sensitive subgroups or on ecosystems.
- **objectives** are policy targets often expressed as a maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedances, within a specified timescale.

The air quality standards and objectives are outlined in **Appendix 2**.

As part of this LAQM role, Local Authorities are required to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. Where a local authority identifies areas of non-compliance with the Air Quality Objectives[3] of pollutants of concern, and there is relevant public exposure, there remains a statutory need to declare the geographic extent of non-compliance as an Air Quality Management Area (AQMA) and to draw up an action plan detailing appropriate measures and policies that can be introduced in order to work towards achieving the objective(s).

The objectives for use by Local Authorities are prescribed within the Air Quality (England) Regulations 2000[4], and the Air Quality (England) (Amendment) Regulations 2002[5]. The AQOs for pollutants

[2] In 1997, the United Kingdom National Air Quality Strategy (NAQS) was published in response to the Environment Act of 1995, setting out a framework of standards and objectives for the air pollutants of most concern (SO_2, PM_{10}, NOx, CO, lead, benzene, 1,3-butadiene and tropospheric ozone), to be achieved by local authorities through a system of Local Air Quality Management (LAQM) by 2005. The aim of the strategy was to reduce the air pollutant impact on human health by reducing airborne concentrations. A review of the NAQS led to the publication of Air Quality Strategy for England, Scotland, Wales and Northern Ireland in January 2000, whilst in July 2007 was further reviewed with various amendments to the Air Quality Objectives for local authorities.
[3] Defra, 2022, Local Air Quality Management Technical Guidance (TG220
[4] The Stationary Office (2000) Statutory Instrument 2000, The Air Quality (England) Regulations 2000, London
[5] The Stationary Office (2002) Statutory Instrument 2002, The Air Quality (England) (Amendment) Regulations 2002, London

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included within the Air Quality Strategy and assessed as part of the scope of this report are summarised in **Table 2.1**. The objectives for NO_2 and PM_{10} were to have been achieved by 2005 and 2004 respectively and continue to apply in all future years thereafter. The $PM_{2.5}$ objective is to be achieved by 2020. It should be noted that Local Authorities in England have a flexible role in working towards reducing emissions and concentrations of $PM_{2.5}$.

Table 2:1: UK Air Quality Objectives for NO_2, PM_{10} and $PM_{2.5}$

Pollutant	Objectives	Averaging Period
Nitrogen dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40µg/m^3	Annual mean
Particulate Matter (PM_{10})	50µg/m^3 not to be exceeded more than 35 times a year	24-hour mean
	40µg/m^3	Annual mean
Particulate Matter ($PM_{2.5}$)*	Work towards reducing emissions/ concentrations of fine particulate matter ($PM_{2.5}$)	Annual mean

* The $PM_{2.5}$ objective, which is to be met by 2020, is not in (Air Quality England) Regulations and there is no requirement for local authorities to assess it, although they are encouraged to do so. The Environmental Improvement Plan 2023 sets out plans to introduce legal targets to reduce $PM_{2.5}$ concentration levels to 10µg/m^3 by 2040 with an interim target or 12µg/m^3 by 2028.

The AQS objectives apply at locations where members of the public are likely to be regularly present and exposed over the averaging period of the objective. **Table 2.2** identifies examples of where the annual mean objectives should apply as provided in LAQM.TG22[6], and include: building facades of residential properties[7], schools, hospitals, etc. The annual mean objectives are not relevant for the building facades of offices or other places of work where members of the public do not have regular access, kerbsides or gardens. The 24-hour mean objective applies to all locations where the annual mean objective would apply, together with hotels and gardens of residential properties. The 1-hour mean objective also applies at these locations as well as at any outdoor location where a member of the public might reasonably be expected to stay for 1-hour or more, such as shopping streets, parks and sports grounds, as well as bus stations and railway stations that are not fully enclosed.

[6] Such locations should represent parts of the garden where relevant public exposure is likely, for example where there are seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.
[7] Moorcroft and Barrowcliffe. et al. (2017) Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London.

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Table 2:2 Examples of where AQS should be applied

Averaging Period	AQS Should Apply	AQS Should Not Apply
Annual Mean	All locations where members of the public might be regularly exposed. Building facades of: • Residential properties* • Schools • Hospitals • Care homes etc.	Building facades of offices or other places of work where members of the public do not have regular access. • Hotels, unless people live there as their permanent residence. • Residential gardens • Kerbside sites or any other location where public exposure is expected to be short term.
24-hour and 8-hour mean	All locations where the annual mean objective would apply. • Hotels • Residential gardens	Kerbside sites or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. • Kerbside sites (e.g. pavements of busy shopping streets) • Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might spend one hour or more. • Any outdoor locations where members of the public might spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-min mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

*Such locations should represent parts of the garden where relevant public exposure is likely, for example where there are seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens, although local adjustment should always be applied.

2.2. Clean Air Strategy

The Clean Air Strategy 2019[8] was released in January 2019 and supersedes the policies featured in The National Air Quality Strategy. The strategy mainly deals with how to improve air quality in England but also discusses air quality policy in the devolved administrations. In comparison with the previous strategies it has a more joined-up approach, incorporating transport, domestic, industrial and agricultural emission reduction policies with a combined focus on both ambient and indoor air quality. The plan also has an emphasis on the proposal to use Clean Air Zones (CAZs) and the ULEZ (in London) to quickly bring highly polluted urban centres below the legal limits. Some of the key

[8] DEFRA, 2019, The Clean Air Strategy 2019

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policies in the plan are a renewed consideration of under-used Smoke Control Areas due to the growth of highly polluting domestic wood burning stoves, new best practices being incorporated into the agricultural sector to reduce ammonia emissions (and their associated secondary particulates) and with a policy to prohibit the sale of new petrol and diesel cars by 2040. However, air quality objective limits outlined in the document are largely unchanged from the previous strategy.

2.3. The Environment Act 2021

The Environment Act 2021 establishes a legally binding duty on government to bring forward at least two new air quality targets in secondary legislation by 31 October 2022. This duty sits within the environmental targets framework outlined in the Environment Act (Part 1).

The proposed air quality targets are:

- *Annual Mean Concentration Target ('concentration target') - a maximum concentration of 10µg/m^3 to be met across England by 2040*
- *Population Exposure Reduction Target ('exposure target') - a 35% reduction in population exposure by 2040 (compared to a base year of 2018).*

The amendments to the Environment Act 1995 made through the Bill will:

- *Strengthen the local air quality management (LAQM) framework to enable greater cooperation at local level and broaden the range of organisations that play a role in improving local air quality. Responsibility for tackling local air pollution will now be shared with designated relevant public authorities, all tiers of local government and neighbouring authorities.*
- *Increase transparency and accountability by requiring the Secretary of State to regularly review the Air Quality Strategy at least every 5 years, and to publish an annual statement to Parliament on progress towards achieving air quality standards and objectives.*

The amendments to the Clean Air Act 1993 made through the Bill will help local authorities reduce pollution from domestic burning, which contributed 38% of $PM_{2.5}$ emissions in 2019. Specifically, the amendments will:

- *Replace the criminal offence of emitting smoke from a chimney in a smoke control area with a civil penalty regime, which allows for the removal of the statutory defences that currently hinder enforcement. This will enable quicker, simpler and more proportionate enforcement at a local level against the emissions of smoke within a smoke control area (SCA).*
- *Give local authorities powers to address pollution from solid fuel burning on inland waterway vessels (for example, canal boats) in smoke control areas.*
- *Strengthen the offences in relation to the sale and acquisition of certain solid fuels for use in smoke control areas, by removing the limit on the fine for delivering unapproved solid fuels to a building in a smoke control area, and requiring retailers of solid fuels to notify customers*

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that that it is illegal to buy unapproved fuel for use in a smoke control area unless burning in an approved appliance.

- *Amendments to the Environmental Protection Act 1990 allow local authorities to take more substantive action against those who repeatedly emit smoke and endanger human health by extending the system of statutory nuisance to private dwellings in SCAs. Smoke from chimneys that causes a nuisance could result in a local authority issuing an abatement notice. Breaching such a notice is a criminal offence and could result in the payment of fine, as is already the case outside SCAs.*

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 Statutory Instrument 2023 No.96 has now been made by the Secretary of State and the targets are identified below:

- A target in respect of the annual mean concentration of $PM_{2.5}$ (fine particulate matter) in ambient air under section 2 of the Environment Act 2021 (c.30) ("the annual mean concentration target"), and
- A long-term target to reduce population exposure to $PM_{2.5}$ (fine particulate matter), within the priority area of air quality under section 1 of that Act ("the population exposure reduction target").

2.4. National Planning Policy

2.4.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was first published on 27th March 2012 and updated on 24th July 2018, 19th February 2019, 20th July 2021, 5th September 2023 and 20th December 2023. The policy sets out the government's planning policies for England and how these are expected to be applied.

The NPPF[9] "sets out the Government's planning policies for England and how these should be applied and provides a framework within which locally-prepared plans for housing and other development can be produced." It includes advice on when air quality should be a material consideration in development control decisions. Relevant sections are set out below:

Section 9 - Promoting sustainable transport:

Paragraph 109

"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making..."

[9] Ministry of Housing, Communities and Local Government, 2019, National Planning Policy Framework

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Section 15 - Conserving and enhancing the natural environment:

Paragraph 180 Bullet point 'e':

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *(e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and*

Paragraph 192:

> *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."*

The NPPF is accompanied by relevant planning practice guidance (PPG)[10], a web-based resource which brings together planning guidance on various topics into one place. Specific guidance in respect to air quality is provided where the guiding principles on how planning can take account of the impact of new development on air quality is included. The PPG states that:

> *"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity."*

The PPG sets out the information that has to be considered when deciding whether an air quality assessment may be required for a planning application, stating that:

> *Where air quality is a relevant consideration the local planning authority may need to establish:*
>
> - *the 'baseline' local air quality, including what would happen to air quality in the absence of the development;*

[10] GOV.UK. (2014). Air quality. [online] Available at: https://www.gov.uk/guidance/air-quality--3 [Accessed 07 October 2023].

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- *whether the proposed development could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity); and*
- *whether occupiers or users of the development could experience poor living conditions or health due to poor air quality.*

It also provides guidance on options for mitigating air quality impacts, and makes clear that:

"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented. Planning conditions and obligations can be used to secure mitigation where the relevant tests are met."

Examples of mitigation include:

- *maintaining adequate separation distances between sources of air pollution and receptors;*
- *using green infrastructure, in particular trees, where this can create a barrier or maintain separation between sources of pollution and receptors;*
- *appropriate means of filtration and ventilation;*
- *including infrastructure to promote modes of transport with a low impact on air quality (such as electric vehicle charging points);*
- *controlling dust and emissions from construction, operation and demolition; and*
- *contributing funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development.*

2.5. Local Planning Policy

2.5.1. Wokingham Borough Core Strategy 2014 - 2032

The Wokingham Borough Core Strategy (Adopted 29 January 2010) has a limited number of references to air quality and no policy that directly references air quality however Policy CP1 is of relevance, and the key points are identified below:

"CP1 – Sustainable development

Planning permission will be granted for development proposals that:

1) Maintain or enhance the high quality of the environment;

2) Minimise the emission of pollutants into the wider environment;

8) Avoid areas where pollution (including noise) may impact upon the amenity of future occupiers;

12) Contribute towards the goal of reaching zero-carbon developments as soon as possible by:

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a) Including appropriate on-site renewable energy features; and

b) Minimising energy and water consumption by measures including the use of appropriate layout and orientation, building form, design and construction, and design to take account of microclimate so as to minimise carbon dioxide emissions through giving careful consideration to how all aspects of development form."

2.6. Relevant Guidance

2.6.1. Local Air Quality Management Technical Guidance (TG22)

The Technical Guidance "*Local Air Quality Management Technical Guidance (TG22)*" (LAQM.TG22) supersedes all previous versions. It is designed to support local authorities in carrying out their duties under the Environment Act 1995 as amended by the Environment Act 2021, the Environment (Northern Ireland) Order 2002, and subsequent regulations. LAQM is the statutory process by which local authorities monitor, assess and take action to improve local air quality.

2.6.2. Land-Use Planning & Development Control: Planning for Air Quality (IAQM, 2017)

This guidance[11] has been produced by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) to ensure that air quality is adequately considered in the land-use planning and development control process. The guidance, of itself, can have no formal or legal status and is not intended to replace other guidance that does have this status. The document was developed for professionals operating within the planning system. It provides them with a means of reaching sound decisions, having regard to the air quality implications of development proposals. It also is anticipated that developers will be better able to understand what will make a proposal more likely to succeed. The guidance is particularly applicable to assessing the impacts of traffic and energy centre emissions and provides advice how to describe air quality impacts and their significance.

[11] Moorcroft and Barrowcliffe. et al. (2017) Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London.

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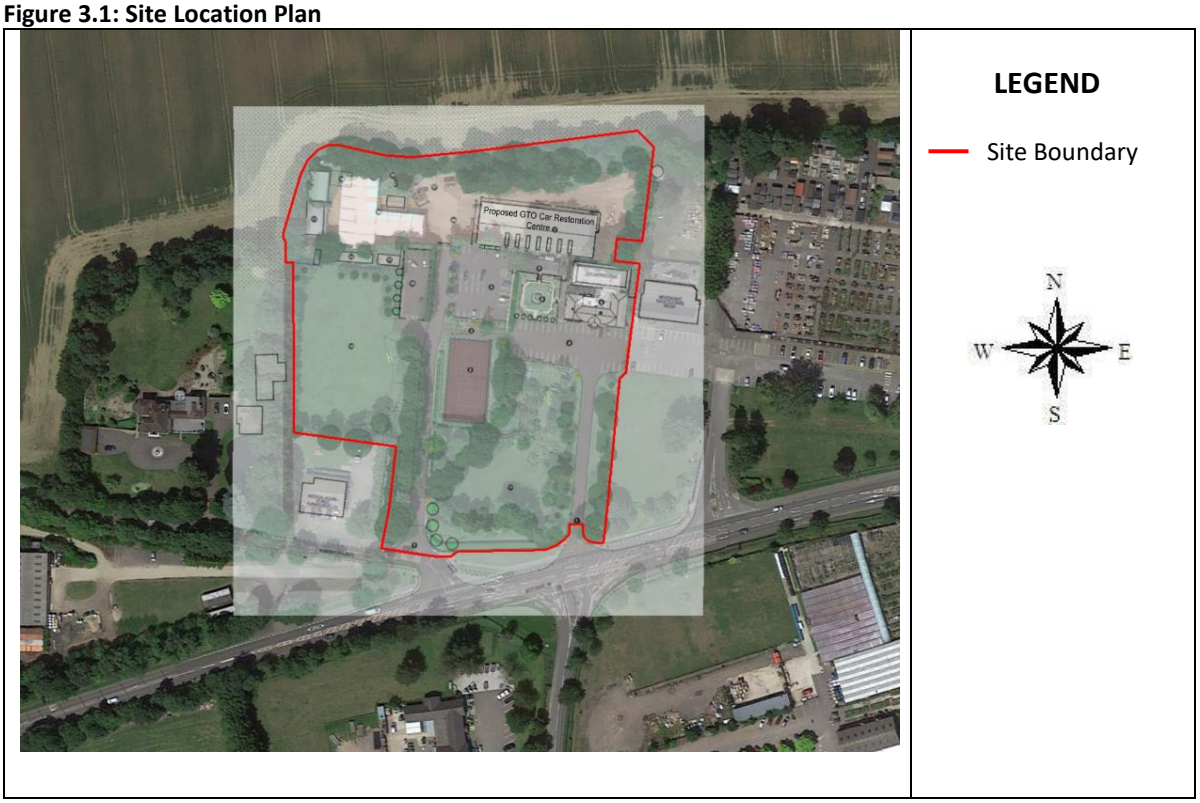
3. SITE DESCRIPTION AND BASELINE CONDITIONS

3.1. Site Description

The proposed development is located at the rear of the GTO House Site and off New Bath Road and Mumbery Hill. Dobbies Garden Centre Hare Hatch is located directly east of the proposed development site.

The location and the red line boundary of the site are detailed below in **Figure 3.1**.

Figure 3.1: Site Location Plan



3.2. Air Quality Review and Assessment

As previously indicated, Local Authorities have been required to carry out a review of local air quality within their boundaries to assess areas that may fail to achieve the limit values. Where these objectives are unlikely to be achieved, local authorities must designate these areas as AQMA's and prepare a written action plan to achieve the AQS's.

The review of air quality takes on several prescribed stages, of which each stage is reported. WBC Air Quality Annual Status Report 2023[12] provides the most recent available air quality monitoring results for the WBC (2022). Details of the monitoring data used for pollutant concentration model verification purposes are provided in **Section 3.3.**

[12] 2023 Air Quality Annual Status Report (ASR) for Surry Heath Borough Council.

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3.3. Local Air Quality Monitoring

WBC monitors local air quality through an automatic monitor and diffusion tube monitoring network. The monitoring sites chosen for verification of the air quality modelling were the diffusion tubes as there was publicly available traffic data for these sites.

The 2022 annual mean NO_2 concentrations for the monitoring sites are identified in **Table 3.1.** The annual mean NO_2 NAQO was not exceeded at any of the monitoring sites.

Table 3:1: Local Monitoring Data Suitable for Model Verification

Monitor Site	Grid Reference		2022 Annual Mean NO_2 (µg/m^3)	2022 Data Capture (%)
	X	Y		
WOK869 - Mullie (26) High Street, Twyford	478681	175998	100.0	21.9
WOK871, WOK875, WOK876 - 15 London Road, Twyford 3	478830	176025	92.6	20.8
WOK877 - Almshouses, London Road	478904	176060	100.0	16.7
WOK 878 - 17 Wargrave Road, Twyford	478719	176100	91.8	19.5
WOK 850, WOK 887, WOK 888 - 19 High Street Twyford 3	478733	175985	100.0	32.8

3.4. Background Concentration of Air Pollutants

Background concentrations of air pollutants for the modelling were obtained from the DEFRA pollutant concentration maps[13]. **Table 3.2** identifies the background pollutant concentrations at the diffusion tube monitoring locations and the proposed development site. All of the estimated background concentrations for the annual mean NO_2 and PM_{10} used in the assessment are significantly below the annual mean objective limit of 40µg/m^3 in 2022 and 2025.

Table 3:2: Background Concentrations of Pollutants

Location and Year	NO_x µg/m^3	NO_2 µg/m^3	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3
Verification - WOK869, and WOK850 WOK887 WOK888 - 2022 478500, 175500	11.36	8.79	11.51	7.30
Verification - WOK871 WOK875 WOK876, WOK877, and WOK884 - 2022 478500, 17600	11.88	9.16	12.30	7.45
Development Site 2025 479500, 178500	10.04	7.83	12.06	7.07
Existing Receptors – ER1 and ER2 2025 479500, 177500	10.34	8.05	12.56	7.09
Existing Receptors – ER2, ER3, and ER4 2025	10.43	8.11	11.51	6.92

[13] DEFRA, *Background Mapping Data for Local Authorities- 2021* [online] Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2021

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Location and Year	NO_x µg/m³	NO_2 µg/m³	PM_{10} µg/m³	$PM_{2.5}$ µg/m³
480500, 177500				
Existing Receptor – ER6 2025 478500, 177500	10.58	8.22	12.56	7.09
Existing Receptor – ER7 and ER8 2025 478500, 176500	10.89	8.45	12.01	7.19

Note: In 2025 the ratio between PM_{10} and $PM_{2.5}$ at the Existing Sensitive Receptors is between 0.56 and 0.60.

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4. METHODOLOGY AND ASSESSMENT CRITERIA

4.1. Methodology

In the UK, DEFRA provides guidance on the most appropriate methods to estimate pollutant concentrations for use in Local Air Quality Management (LAQM). DEFRA regularly updates its Technical Guidance, with the latest LAQM Technical Guidance (TG22) published in August 2022. The methodology in LAQM.TG22, directs air quality professionals to a number of tools published by DEFRA to predict and manage air quality. For example, it is necessary to use the updated NO_x to NO_2 calculator to derive NO_2 concentrations from the NO_x outputs from Breeze Roads modelling. This is because NO_2 concentrations within the model are predicted using the CALINE4 NO_x to NO_2 conversion methodology, which should not be used within the model as current evidence shows that the proportion of primary NO_2 in vehicle exhausts has increased since the model was developed, which would affect the relationship between NO_x and NO_2 at roadside locations.

In order to determine the extent to which air quality issues will affect the development of the site, the study has considered the following:

- Any air quality measurements carried out in the area near the proposed development; and
- The most recent Air Quality Review and Assessment Reports from WBC.

4.2. Breeze Roads Modelling of Pollutant Concentrations

Dispersion modelling has been undertaken using Breeze Roads to determine air quality concentrations across the site. Breeze Roads is an air dispersion modelling software suite that predicts air quality impacts of carbon monoxide (CO), nitrogen dioxide, particulate matter (PM), and other inert pollutant concentrations from moving and idling motor vehicles at or alongside roadways and roadway intersections.

Breeze Roads can be used in conjunction with the MOBILE5, EMFAC emission models or other emissions data, to demonstrate compliance with the UK's National Air Quality Strategy. Breeze Roads predicts air pollutant concentrations near highways and arterial streets due to emissions from motor vehicles operating under free-flow conditions and idling vehicles. In addition, 1-hour and running 8-hour averages of CO or 24-hour and annual block averages of PM_{10} can be calculated.

4.3. Model Set-up Parameters

The most recent Emissions Factor Toolkit (EFT, version 12.1, August 2024) issued by DEFRA was used to derive emissions rates (in grams per kilometre) for vehicle movements along roads incorporated into the model.

Meteorological data from Farnborough Airfield (2022) has been utilised for the dispersion modelling, which is considered representative of the development area, and the wind rose is shown in **Appendix 3**.

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4.4. Assessment Criteria

A detailed assessment was considered appropriate for this proposed development with model results being verified against local monitoring data. This was undertaken using the detailed dispersion model Breeze Roads.

For the purposes of this assessment, the limit values assigned to individual pollutants as set out in the Air Quality Standards Regulations 2010 form the basis of the air quality assessment. The limit values are based on an assessment of the effects of each pollutant on public health. Therefore, they are a good indicator in assessing whether, under normal circumstances, the air quality in the vicinity of a development is likely to be detrimental to human health.

4.5. Operation Phase

The main pollutants of concern are generally considered to be NO_2 and PM_{10} for road traffic. The Breeze Roads methodology has been used for this assessment to predict the air quality impacts of any additional traffic generated from the development on surrounding sensitive receptors.

For the assessment, the following scenarios were considered:

- 2022 Model Verification; and
- 2025 with development.

Traffic Data

The Breeze Roads prediction model requires the user to provide various input data, including the Annual Average Daily Traffic (AADT) flow, the number of heavy-duty vehicles (HDVs), the distance of the road centreline from the receptors and vehicle speeds. The traffic information is detailed in **Table 4.1** and **Table 4.2** below for the verification and assessment scenarios.

Table 4.1 identifies the traffic data for 2022 which was utilised for the verification. Traffic flow and vehicle split data were obtained from the DfT (2022). Vehicle speeds were based on speed estimations and were subsequently adjusted where it was deemed, they were not sufficiently accurate, e.g. at junctions, crossings, etc.

Table 4:1: 2022 Traffic Flow Data for Verification

Road Section	AADT	HDV%
A3032 – London Road	5,643	1.97
A3032 – Old Bath Road	7,415	2.44
A321 – Wargrave Road	6,278	4.21

Note: This is a non-exhaustive summary of the road sections modelled and includes the sections that are likely to contribute the greatest emissions to the existing sensitive receptors.

Table 4.2 identifies the estimated AADT traffic flows for roads near the proposed development site. DFT data was scaled to the earliest expected occupation year of the proposed development, 2025, using a growth factor of 1.0410 obtained from TEMPro. i-Transport (the project transport consultant)

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has predicted that the proposed development will result in 311 traffic movements per day onto the local road network, this has been added to all of the roads used within this assessment as a worst-case scenario, as traffic distribution was not required to be included within i-Transports transport assessment. Two scenarios were produced and are identified in **Table 4.2**:

- 2025 Baseline; and
- 2025 Baseline + Development

Table 4:2: 2025 Opening Year Traffic Flow Data

Road	AADT 2025 Baseline	%HDV	AADT 2025 Baseline with Development	%HDV
A4 - Bath Road	19,773	2.65%	20,084	2.61%
Mumbery Hill	3,232	0.80%	3,543	0.73%
A321 – Wargrave Road	6,679	4.05%	6,990	3.87%

Note: This is a non-exhaustive summary of the road sections modelled and includes the sections that are most likely to contribute the greatest emissions to the existing sensitve receptors.

4.6. Model Verification

Model validation undertaken by the software developer will not have been carried out in the vicinity of the site being considered in this assessment. As a result, it is necessary to perform a comparison of the modelled results with local monitoring data at suitable locations where data is available. This verification process aims to minimise model uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results. The verification was carried out in accordance with LAQM.TG22. Suitable monitoring data for the purpose of verification is available for concentrations of NO_2 at the monitoring positions detailed in **Section 3.3**.

When the monitored and modelled results are compared as recommended in LAQM.TG22 the road NO_X adjustment factor is **10.997** (as identified in **Table 4.3**). This factor was applied to all modelled NO_x results prior to calculating modelled NO_2 using the NO_x to NO_2 calculator. In the absence of appropriate PM_{10} monitoring within close proximity to the site, the NO_x adjustment factor has also been applied to the PM_{10} modelled concentrations, in accordance with the guidance provided in LAQM.TG22.

Table 4:3: NO_2 Annual Mean Verification for 2022

Monitoring Position	Monitored		Modelled		% Difference (NO_x Roads) Before Adjustment	% Difference (NO_2 Total) After Adjustment	Road NO_X Factor
	Road NO_2 µg/m³	Road NO_x[14] µg/m³	Road NO_2 µg/m³	Road NO_X µg/m³			
WOK869 - Mullie (26) High Street, Twyford	13.11	29.53	1.62	3.33	-88.71	12.65	**10.997**

[14] Obtained from NO_X to NO_2 Calculator Spreadsheet available from www.laqm.Defra.gov.uk

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Monitoring Position	Monitored		Modelled		% Difference (NO_x Roads) Before Adjustment	% Difference (NO_2 Total) After Adjustment	Road NO_x Factor
	Road NO_2 $\mu g/m^3$	Road NO_x[14] $\mu g/m^3$	Road NO_2 $\mu g/m^3$	Road NO_x $\mu g/m^3$			
WOK871, WOK875, WOK876 - 15 London Road, Twyford 3	11.64	25.96	1.38	2.85	-89.02	10.34	
WOK877 - Almshouses, London Road	7.54	16.27	0.62	1.28	-92.15	-5.87	
WOK 878 - 17 Wargrave Road, Twyford	10.34	22.81	0.94	1.92	-91.57	-3.59	
WOK 850, WOK 887, WOK 888 - 19 High Street Twyford 3	24.01	60.04	2.33	4.84	-91.94	-6.80	

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5. IMPACTS AND CONSTRAINTS OF AIR QUALITY

5.1. Air Quality Impact of Development Traffic - Acceptability Criteria

It is common in the UK to use the Environmental Protection UK's (EPUK) Guidance[15] on Air Quality Assessments for Planning Applications to assess the impact of a development. This advises that an air quality assessment will be required where the development is anticipated to give rise to significant changes in air quality. There will also be a need to assess air quality implications of a development where a significant change in relevant exposure is anticipated. A full air quality assessment should normally be undertaken where proposals give rise to significant changes in traffic flows, typically a change in annual average daily traffic (AADT) of 100 LDV flows in or adjacent to an AQMA or 500 LDV flows elsewhere. Other changes caused by a development such as a major new junction, significant road realignment or a substantial increase in HDV traffic may also warrant a full impact assessment.

5.2. Air Quality Impacts

In January 2017, Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) updated their guidance on "Land-Use Planning and Development Control: Planning for Air Quality". The guidance provides a methodology for determining the impacts of increased pollutant concentrations at sensitive receptor locations resulting from emission sources such as the generation of traffic from development sites.

To characterise the impacts of the proposed development on local air quality, predictions of air pollutant concentrations have been made using the Breeze Roads dispersion model.

Table 5:1: Impacts of Pollutant Concentrations as a result of the Development

Long-Term Average Concentration in Assessment Year	% Change in Concentration relative to the Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial
The AQAL is the Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level'				

5.3. Air Quality Impact of Development Traffic - Assessment

The proposals are for the proposed redesign and expansion of facilities at the existing car restoration centre at Bath Road, Twyford. The proposed development consists of the demolition of the existing storage shed and the construction of a new GTO Car Restoration Centre in its place.

[15] Environmental Protection UK and IAQM (2017, v1.2) – Land-Use Planning and Development Control: Planning for Air Quality

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The development proposals will result in a worst-case increase of 311 vehicle movements per day, as detailed in **Table 4.2**.

The existing sensitive receptor locations are identified in **Appendix 4** and the modelled predicted NO_2 and particulate matter pollutant concentrations at these existing receptors are identified in **Tables 5.2** and **5.3**.

5.4. Predicted Air Quality Constraints on the Development

As the proposed development does not include any residential development, a constraints assessment is not required.

5.5. Pollutant Concentrations at Existing Sensitive Receptors

5.5.1. Annual Mean NO_2 Concentrations

Table 5.2 identifies the modelled NO_2 concentrations at representative existing sensitive receptors adjacent to the highway network for the worst-case scenario for which there will be no exceedances of the AQO. All impacts are classified based on the criteria found in **Table 5.1**.

All of the receptors have pollutant concentrations which are "75% or less of the AQAL", and as the % change in concentration relative to the Air Quality Assessment Level is <1%, all the modelled changes in pollutant concentrations are classified as negligible (**Table 5.2**).

All of the pollutant concentrations will remain below the annual NO_2 AQO. In respect of the NO_2 1-hour AQO, there is only a risk that the NO_2 1-hour objective (200µg/m^3) could be exceeded at local sensitive receptors if the annual mean NO_2 concentration is greater than 60µg/m^3. Therefore, exceedances of NO_2 1-hour AQO would not be expected as the worst-case annual mean predicted concentration is 26.1µg/m^3 (ER6). With the development completed and operational there is predicted to be a maximum increase of 0.2µg/m^3 (ER3, ER4, and ER6) in annual mean NO_2 concentrations.

Table 5:2: Modelled 2025 NO_2 Concentrations – Existing Receptors

Receptor	Air Quality Objective (µg/m^3)	Without Development Total NO_2 (µg/m^3)	With Development Total NO_2 (µg/m^3)	Change in Concentration (µg/m^3)	% Change in Concentration relative to the Air Quality Assessment Level (AQAL)	Impact Descriptor
ER1	40	11.0	11.0	0.0	0.2%	Negligible
ER2		13.4	13.5	0.1	0.2%	Negligible
ER3		20.3	20.5	0.2	0.5%	Negligible
ER4		19.7	19.9	0.2	0.4%	Negligible
ER5		12.3	12.4	0.1	0.2%	Negligible

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Receptor	Air Quality Objective ($\mu g/m^3$)	Without Development Total NO_2 ($\mu g/m^3$)	With Development Total NO_2 ($\mu g/m^3$)	Change in Concentration ($\mu g/m^3$)	% Change in Concentration relative to the Air Quality Assessment Level (AQAL)	Impact Descriptor
ER6		25.9	26.1	0.2	0.4%	Negligible
ER7		12.1	12.2	0.1	0.3%	Negligible
ER8		10.6	10.7	0.1	0.2%	Negligible

5.5.2. Annual Mean Particulate Matter Concentrations

Table 5.3 and **5.4** identify the modelled PM_{10} and $PM_{2.5}$ concentrations both with and without the development completed and fully operational at excising receptor locations.

All of the receptors have PM_{10} pollutant concentrations which are "75% or less of the AQAL" and therefore all the modelled changes in pollutant concentrations are classified as negligible (**Table 5.3**).

The highest predicted annual mean PM_{10} concentration with the development is 16.2$\mu g/m^3$ (ER3). With the development completed and operational there is predicted to be a maximum increase of 0.1$\mu g/m^3$ (ER4) in annual mean PM_{10} concentrations.

Table 5:3: Modelled 2025 PM_{10} Concentrations – Existing Receptors

Receptor	Total PM_{10} Without Development $\mu g/m^3$ (Days >50 $\mu g/m^3$)	Total PM_{10} With Development $\mu g/m^3$ (Days >50 $\mu g/m^3$) [16]	Change in PM_{10} ($\mu g/m^3$)	% Change in Concentration relative to the Air Quality Assessment Level (AQAL)	Impact Descriptor
ER1	13.4 (0)	13.4 (0)	0.0	0.1%	Negligible
ER2	13.4 (0)	13.4 (0)	0.0	0.1%	Negligible
ER3	16.2 (0)	16.2 (0)	0.0	0.2%	Negligible
ER4	15.9 (0)	16.0 (0)	0.1	0.2%	Negligible
ER5	14.0 (0)	14.0 (0)	0.0	0.1%	Negligible
ER6	15.9 (0)	15.9 (0)	0.0	0.1%	Negligible
ER7	13.1 (0)	13.1 (0)	0.0	0.1%	Negligible
ER8	12.7 (0)	12.7 (0)	0.0	0.0%	Negligible

[16] Not to be exceeded more than 35 times a year

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All of the receptors have $PM_{2.5}$ pollutant concentrations which are at "75% or less of the AQAL" and therefore all the modelled changes in pollutant concentrations are classified as negligible (**Table 5.4**).

The highest predicted annual mean $PM_{2.5}$ concentration with the development is 9.8µg/m^3 (ER3). With the development completed and operational there is predicted to be a maximum increase of 0.1µg/m^3 (ER3) in annual mean PM_{10} concentrations.

Table 5:4: Modelled 2025 $PM_{2.5}$ Concentrations – Existing Receptors

Receptor	Total $PM_{2.5}$ Without Development µg/m^3	Total $PM_{2.5}$ With Development µg/m^3	Change in $PM_{2.5}$ (µg/m^3)	% Change in Concentration relative to the Air Quality Assessment Level (AQAL)	Impact Descriptor
ER1	7.6	7.6	0.0	0.1%	Negligible
ER2	8.1	8.1	0.0	0.2%	Negligible
ER3	9.7	9.8	0.1	0.4%	Negligible
ER4	9.6	9.6	0.0	0.4%	Negligible
ER5	7.9	7.9	0.0	0.1%	Negligible
ER6	9.0	9.0	0.0	0.3%	Negligible
ER7	7.8	7.8	0.0	0.1%	Negligible
ER8	7.6	7.6	0.0	0.1%	Negligible

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6. MITIGATION

6.1. Operation Phase

As identified by the impact assessment, there are no exceedances of the NAQO's for PM_{10} or $PM_{2.5}$ at any of the existing sensitive receptors.

There are negligible predicted increases in NO_2, PM_{10} and $PM_{2.5}$ concentrations at the existing receptors with the development in place.

Of the existing receptors, the highest resultant annual mean NO_2 pollutant concentration is at ER6 with a concentration of 26.1µg/m^3, which has a negligible increase as a result of the development scheme.

Of the existing receptors, the highest resultant PM_{10} and $PM_{2.5}$ pollutant concentrations were at ER3 with a concentration of 16.2µg/m^3 and 9.8µg/m^3 respectively which has a negligible increase as a result of the development scheme.

Accordingly, as the impacts on the existing receptors are negligible, mitigation is not required.

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7. CONCLUSIONS

The air pollutant concentration modelling has identified that there will be a negligible increase in nitrogen dioxide and particulate matter concentrations at existing sensitive receptors as a result of the development scheme. There are no existing sensitive locations which will exceed the AQO, as a result of the proposed development.

Accordingly, air quality impacts of the proposed development scheme, in accordance with the requirements of the NPPF and 'agent of change principle' are considered to be acceptable, and mitigation is not required.

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APPENDICES

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Appendix 1: Glossary of Terms

AADT	Annual Average Daily Traffic
AAHT	Annual Average Hourly Traffic
AQMA	Air Quality Management Area - An area that a local authority has designated for action, based upon predicted exceedances of Air Quality Objectives.
AQS/ NAQOs	Air Quality Standard/ National Air Quality Objectives - The concentrations of pollutants in the atmosphere, which can broadly be taken to achieve a certain level of environmental quality. The standards are based on assessment of the effects of each pollutant on human health including the effects on sensitive sub groups.
AURN	Automatic Urban and Rural Network Air Quality Monitoring Site.
Calendar Year	The average of the concentrations measured for each pollutant for one year. In the case of the AQS this is for a calendar year.
Concentration	The amount of a (polluting) substance in a volume (of air), typically expressed as a mass of pollutant per unit volume of air (for example, micrograms per cubic metre, $\mu g/m^3$) or a volume of gaseous pollutant per unit volume of air (parts per million, ppm).
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EFT	Emissions Factor Toolkit
Exceedance	A period of time where the concentration of a pollutant is greater than the appropriate Air Quality Objective.
HDV	Heavy Duty Vehicle
HGV	Heavy Goods Vehicle
LAQM	Local Air Quality Management
Nitrogen Oxides	Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. NO is not considered to be harmful to health. However, once released to the atmosphere, NO is usually very rapidly oxidised to nitrogen dioxide (NO_2), which is harmful to health. NO_2 and NO are both oxides of nitrogen and together are referred to as nitrogen oxides (NO_x).
PM_{10}/$PM_{2.5}$	Fine Particles are composed of a wide range of materials arising from a variety of sources including combustion sources (mainly road traffic), and coarse particles, suspended soils and dust from construction work. Particles are measured in a number of different size fractions according to their mean aerodynamic diameter. Most monitoring is currently focused on PM_{10} (less than 10 microns in aero-dynamic diameter), but the finer fractions such as $PM_{2.5}$ (less than 2.5 microns in aero-dynamic diameter) is becoming of increasing interest in terms of health effects.
TEMPro	TEMPro is software produced by the DfT to calculate the expected growth of traffic by year on roads throughout the country. The factor varies depending on the region and type of road.
$\mu g/m^3$	Micrograms per cubic metre of air - A measure of concentration in terms of mass per unit volume. A concentration of $1\mu g/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollution.

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Appendix 2: Air Quality Standards

Pollutant	Averaging Period	Limit Value	Margin of Tolerance
Benzene	Calendar Year	5µg/m^3	
Carbon Monoxide	Maximum daily running 8 Hour Mean	10mg/m^3	
Lead	Calendar Year	0.5µg/m^3	100%
Nitrogen Dioxide	One Hour	200µg/m^3 Not to be exceeded more than 18 times per year	
	Calendar Year	40µg/m^3	
Particulates (PM_{10})	One day	50µg/m^3 Not to be exceeded more than 35 times per year	50%
	Calendar Year	40µg/m^3	20%
Particulates ($PM_{2.5}$)	Calendar Year	12µg/m^3	20%
Sulphur Dioxide	One Hour	350µg/m^3 Not to be exceeded more than 24 times per calendar year	150µg/m^3
	One Day	150µg/m^3 Not to be exceeded more than 3 times per calendar year	

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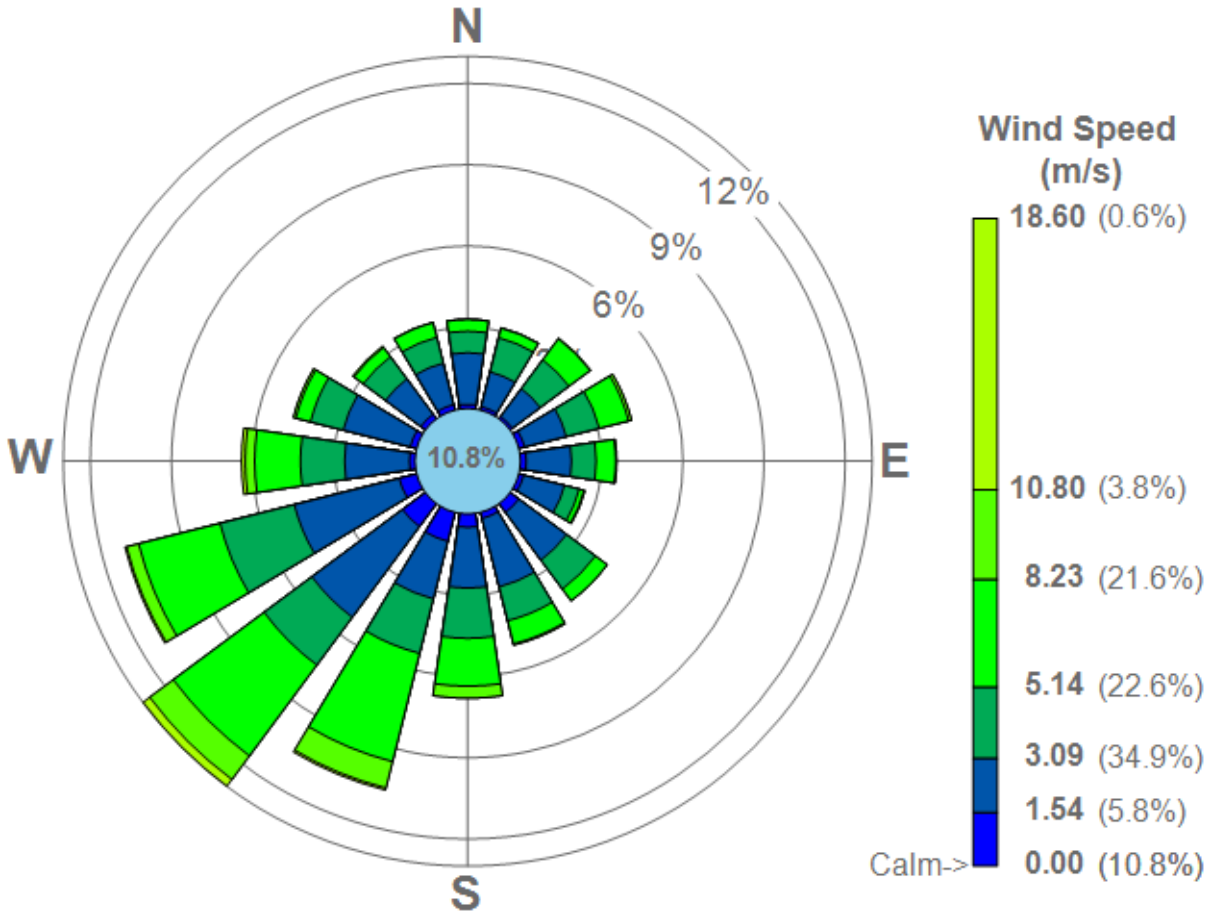
Appendix 3: Farnborough Airfield Windrose (2022)



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Appendix 4: Proposed Development - Representative Existing Receptor Locations

LEGEND

Existing Receptor Location and Number

Application Site Boundary

N
W
E
S

Client: GTO Engineering		Proposed Development - Nearby Existing Receptors		Design:	HR
				Drawn:	HR
Rev: A	Description: FINAL	Project: GTO Car Restoration Centre, Twyford		Checked:	GP
				Approved:	GP

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Appendix 4

Scale: On Map

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